

High Power Helicon Plasma Propulsion, Phase I

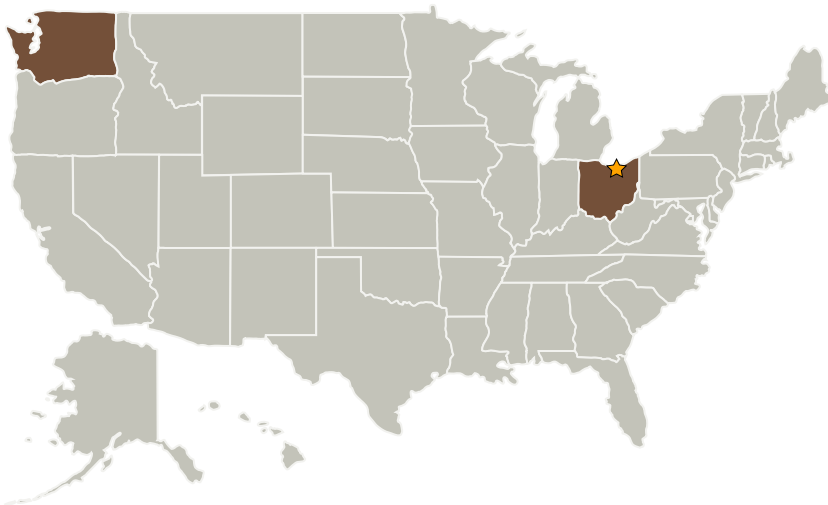
Completed Technology Project (2004 - 2005)



Project Introduction

The proposed work seeks to develop and optimize an electrode-less plasma propulsion system that is based on a high power helicon (HPH) that is being developed collaboratively between MSNW and the University of Washington. The helicon is well suited for this task, as it is known for efficient production of high-density plasmas. The proposed system takes helicon research into an entirely unexplored regime of high power, moving from the traditional kW level discharges to tens and hundreds of kW. Preliminary results indicate that it has excellent potential for making an efficient propulsion system with an estimated thrust of about 1 N for 50 kWe. Higher thrust levels are expected with optimization of its operational characteristics, particularly the addition of a magnetic nozzle that will facilitate conversion of thermal energy into directed flow. Numerical modeling will be employed to understand the relevant physics, and help determine the optimal thruster configuration. Scaling studies will determine the power levels where HPH is competitive or surpasses other systems under consideration for NASA's higher power missions. Based on results, a plan for the complete system design and test demonstration of the HPH to be realized in Phase II will be detailed.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
MSNW Inc	Supporting Organization	Industry	Bellevue, Washington

Primary U.S. Work Locations	
Ohio	Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John Slough

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.3 Power Management and Distribution
 - └ TX03.3.3 Electrical Power Conversion and Regulation